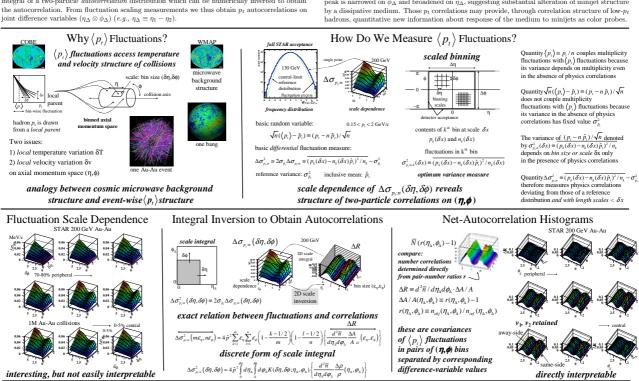
Large-scale two-particle p_t correlations from inverted $\langle p_t \rangle$ fluctuation scale dependence observed in Au-Au collisions at $\sqrt{s_{NN}} = 200~{\rm GeV}$

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Abstract:

We report measurements of large-scale, charge-independent two-particle p_t correlations on axial momentum components (η, ϕ) inferred from event-wise $\langle p_t \rangle$ fluctuation scaling with $p_t < 2$ GeV/c in 200 GeV Au-Au collisions. Recently-observed nonstatistical $\langle p_t \rangle$ fluctuations can be attributed to event-wise and/or intra-event variation of a sampled inclusive parent p_t distribution. Variation of excess $\langle p_t \rangle$ fluctuations with binning scale (bin sizes $\delta \eta, \delta \phi$) are simply related to the integral of a two-particle autocorrelation distribution which can be numerically inverted to obtain the autocorrelation. From fluctuation scaling measurements we thus obtain p_t autocorrelations on joint difference variables $\langle \eta_\Delta \otimes \phi_\Delta \rangle$ (e.g., $\eta_\Delta \equiv \eta_1 - \eta_2$). By analogy with inclusive one-dimensional p_t distributions we expect the structure of such p_t autocorrelations to be determined by a combination of temperature and velocity $(e,g_s,$ collective flow) two-point correlations on hadronic and prehadronic media. We indeed observe highly structured autocorrelation distributions, minijets being a possible contributing mechanism. We find that with increasing centrality the away-side peak structure is dramatically reduced, while the same-side peak is narrowed on ϕ_Δ and broadened on η_Δ , suggesting substantial alteration of minijet structure by a dissipative medium. Those p_t correlations may provide, through correlation structure of low- p_t hadrons, quantitative new information about response of the medium to minijets as color probes.



Minijets Propagate in a Dissipative Medium peripheral STAR 200 GeV Au-Au v_p v₂ removed necking wmAP analogy temperature distribution wmAP power spectrum wmAP power spectrum wiener khinchine theorem

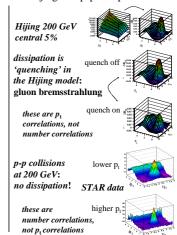
increase of

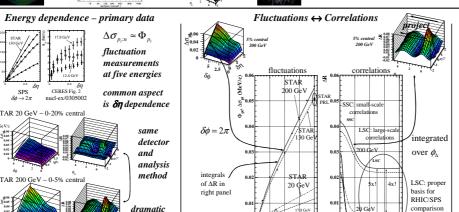
structure

Conclusions

- Inversion of fluctuation scale dependence provides quick access to two-particle correlations
- p_t correlations reveal largeamplitude structures which can be associated with minijets
- Centrality dependence suggests strong dissipation of minijets by a colored medium in central events
- Novel structure includes 'necking' on φ_Δ in central events
- Energy dependence suggests a minijet threshold near 10 GeV
- Is this threshold responsible for the SPS 'new state of matter?'

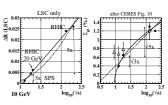
Hijing and p-p comparisons





CERES data

Energy Dependence: $SPS \rightarrow RHIC$



LSC region excludes soft physics contributions at small scale (HBT, Coulomb) dominating at SPS energies

monotonic increase with $\sqrt{s_{NN}}$ minijet threshold near 10 GeV? effect on hadrochemistry?